## 1.0 PURPOSE AND SCOPE

(5.1.2)

This standard provides the requirements for evaluations, repairs, alterations, and re-rating of unfired pressure-vessels and pressure piping, subsequent to installation in the Tank Farm, so that these items will continue to be safe for use. The scope of this standard is limited to pressure equipment covered by the rules of:

- 29 CFR 1910, Subpart M, Section 169, Compressed Gas and Compressed Air Equipment.
- 10CFR851, Worker Safety and Health Program
- ASME Boiler and Pressure Vessel (B&PV) Code Section VIII - Rules for Construction of Pressure Vessels
- ASME B&PV Code Section XI Rules for Inservice Inspection of Nuclear Power Plant Components
- ASME B31 Code for Pressure Piping.
- ASME PCC-2 Repair of Pressure Equipment and Piping
- API-510 Pressure Vessel Inspection Code: In-Service Inspection, Rating, Repair, and Alteration
- API 570 Piping Inspection Code: In-Service Inspection, Rating, Repair, and Alteration of Piping Systems
- API 579-1/ASME FFS-1 Fitness-For Service

The Tank Farms do not contain any pressure equipment built to the rules of ASME B&PV Code Section III for which ASME B&PV Section XI rules apply however this B&PV Code section is included to provide another tool for evaluation and repair of pressure equipment.

## 2.0 IMPLEMENTATION

This standard is effective on the date shown in the header.

Deviations to any requirements of this standard shall be requested from the standard owner. Approved deviations shall be documented in the accompanying standard basis document RPP-RPT-55465.

The use of allowed equivalencies in this standard shall be requested from and approved by the standard owner and the Engineering Discipline Lead - Mechanical if different from the standard owner. Approved allowed equivalencies and the basis for their use shall be documented in the accompanying standard basis document, RPP-RPT-55465.

## 3.0 STANDARD REQUIREMENTS AND BASES

The ASME and API new construction codes and standards for pressure equipment provide rules for the design, fabrication, inspection, and testing of new pressure vessels and piping systems. During the design stage these rules in general provide an adequate margin for deterioration to allow safe operation during the projected service life of the equipment. However, these codes and standards do not provide rules to evaluate equipment that degrades due to actual service conditions or deficiencies resulting from latent construction defects found during subsequent

examinations or inspections. In addition these codes and standards do not provide guidance for modifying or rerating pressure equipment to accommodate changing service needs.

The following sections provide the references to guide inspection, repair or modification of pressure systems however it must be recognized that engineering judgment must be employed in the selection of those sets of code or standard rules suitable for the specific service or need. While engineering judgment must be consistent with the philosophy of the relevant codes and standards, it must never be used to overrule the mandatory requirements or specific prohibitions of the codes or standards employed.

## 3.1 ASME Code Stamped or Non-Code Stamped Tanks and Vessels

An ASME Code stamped vessel ("U" stamp) is designed and constructed in accordance with the rules of the B&PV Code Section VIII. When these rules do not apply as noted in U-1(c)(2) or because of pressure range, vessel geometry or use of special materials, a Non-Code vessel may be constructed in accordance with 10 CFR 851, Appendix A4, Pressure Safety, to provide equivalent protection. For either a Code stamped or Non-Code stamped vessel the rules of API 510 shall apply. The methods and procedures in API 510 may be augmented and supplemented by API 579-1/ASME FFS-1 as determined by the Design Authority. (5.1.1, 5.1.3, 5.1.4, 5.1.5)

1. Prior to initiating repairs or alterations an evaluation may be performed in accordance with API 579-1/ASME FFS-1 to make a run-repair-replace decision. The evaluation can help determine if the degraded pressure tank or vessel can continue to operate safely for some period of time or if immediate repairs or replacement should be performed.

2. Repairs and alterations of pressure tanks or vessels shall comply with API 510 Section 8.1 or ASME PCC-2 as determined by the Design Authority. In addition to the Authorized Inspector, repairs and alterations shall be approved by the Design Authority. The Owner (Department of Energy [DOE] Office of River Protection [ORP]) shall be informed of the planned repairs or alterations. (5.1.1, 5.1.3, 5.1.4, 5.1.5)

3. Re-rating of a pressure tank or vessel shall comply with API 510 Section 8.2. In addition to the Authorized Inspector, re-rating must be approved by the Design Authority. The Owner shall be informed of the re-rating intent.

## 3.2 Pressure Piping

Tank Farm piping systems, with the exception of the site-wide water distribution system which may use American Water Works Association (AWWA) standards, are designed, fabricated, and installed in accordance with ASME B31.1, Power Piping, ASME B31.3, Process Piping, or ASME B31.9, Building Services Piping.

1. Prior to initiating repairs or alterations an evaluation may be performed in accordance with API 579-1/ASME FFS-1 to make a run-repair-replace decision. The evaluation can help determine if the degraded piping can continue to operate safely for some period of time or if immediate repairs or replacement should be performed. The Owner (Department of Energy [DOE] Office of River Protection [ORP]) shall be informed of the planned repairs or alterations.

2. Repairs and alterations of pressure piping shall be guided by the applicable construction code and as amended by the Design Authority: (5.1.3, 5.1.4, 5.1.5)

   a. B31.3 piping repairs shall be guided primarily by API 570 Section 8.1, but may be supplemented by ASME PCC-2 and API 579-1/ASME FFS-1.

   b. B31.1 piping repairs shall be guided primarily by B31.1 Non-Mandatory Appendix V, but may be supplemented by ASME PCC-2, API 579-1/ASME FFS-1, and/or ASME B&PV Section XI.

   c. B31.9 repairs shall be guided by PCC-2.

3. Re-rating of pressure piping shall be guided by the applicable construction code and as amended by the Design Authority. The Owner (Department of Energy [DOE] Office of River Protection [ORP]) shall be informed of the planned re-rating: (5.1.3, 5.1.4, 5.1.5)

   a. B31.3 piping re-rating shall be guided by API 570 Section 8.3 and may be supplemented by API 579-1/ASME FFS-1.

   b. B31.1 piping re-rating shall be guided by B31.1 Non-mandatory Appendix V and may be supplemented by API 579-1/ASME FFS-1and/or ASME B&PV Section XI.

   c. B31.9 piping re-rating is not specifically covered in this Code section since the pressure service applications are limited (see Paragraph 900).

## 4.0 DEFINITIONS

Alteration. A physical change in any component that has design implications affecting the pressure containing capability or the flexibility of a piping system. Installing comparable or duplicate replacements is not considered an alteration.

Authorized inspector. An inspector, commissioned by the National Board of Boiler and Pressure Vessel Inspectors and certified by the Washington State Department of Labor and Industry.

Construction Code. The code or standard to which the piping system was originally built. A later edition or addendum of the construction code may be used provided the technical requirements, i.e., those requirements that could affect materials, design, fabrication, pressure boundary, or component support, are reconciled. Code cases may also be used. Administrative requirements, i.e., those that do not affect the pressure boundary or component support, need not be reconciled.

In-Service. Piping systems placed in operation. This does not include piping systems, or portions thereof, that are still under construction.

Owner. For the Tank Farms the Owner is the U.S. Department of Energy (DOE) Office of River Protection (ORP).

Piping Engineer. One or more persons or organization acceptable to the user who are knowledgeable and experienced in the engineering disciplines associated with evaluating mechanical and material characteristics affecting the integrity and reliability of piping

components and systems. For the Tank Farm applications the piping engineer is the designated Design Authority.

Pressure Boundary. The portion of the piping or vessel that contains the pressure.

Process Piping. For Tank Farm applications process piping includes all piping used to transfer tank waste. Utility piping, e.g. compressed air or service water is not considered process piping.

Repair. The work necessary to restore a piping system or vessel to a condition suitable for safe operation at the design conditions. If any of the restorative work results in a change to the design temperature or design pressure, the requirements of re-rating shall be satisfied.

Re-rating. A change in the design temperature, design pressure, or maximum allowable working pressure (MAWP) of a piping system or pressure vessel. Derating below original design conditions is a means to provide increased corrosion allowance.

Replacement. A type of repair completed by fabrication and installation of spare or renewal parts of an item.

User. Entity who exercises control over the operation, engineering, inspection, repair, alteration, pressure testing, and rating of the piping and pressure vessels. For the Tank Farms the User is Washington River Protection Solutions (WRPS) LLC.

## 5.0 SOURCES

### 5.1 Requirements

1. 10 CFR 851, "Worker Safety and Health Program."
2. DOE O 252.1A, "Technical Standards Program."
3. DOE O 433.1B, "Maintenance Management Program for DOE Nuclear Facilities."
4. RPP-RPT-55465, "Technical Basis Document for TFC ENG-STD-19, Alteration and Repair of ASME-Coded Pressure Systems."
5. TFC-PLN-29, "Nuclear maintenance Management Plan."

### 5.2 References

1. 29 CFR 1910, Subpart M, Section 169, "Compressed Gas and Compressed Air Equipment."
2. American Petroleum Institute (API), API Publishing Services, Washington, D.C.
   a. API 510, "Pressure Vessel Inspection Code: In-Service Inspection, Rating, Repair, and Alteration" 2006
   b. API 570, "Piping Inspection Code: In-Service Inspection, Rating, Repair, and Alteration of Piping Systems" 2009
   c. API 579-1/ASME FFS-1, "Fitness-For-Service", 2007

3. ASME B31 Code for Pressure Piping.

   a. Section B31.1, "Power Piping."
   b. Section B31.3, "Process Piping."
   c. Section B31.9, "Building Services Piping."

4. ASME PCC-2, "Repair of Pressure Equipment and Piping" 201.

5. ASME Boiler and Pressure Vessel Code, American Society of Mechanical Engineers, New York, New York.

   a. Section III, "Rules for Construction of Nuclear Power Plant Components."
   b. Section VIII, "Rules for Construction of Pressure Vessels."
   c. Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components."